

In the Specification

Please amend the specification beginning on page 1, line 1 and ending on page 4, line 3 as follows:

Description

CONFIGURATION OF AT LEAST TWO EXHAUST GAS TURBOCHARGERS

Configuration of at least two exhaust gas turbochargers

FIELD OF THE INVENTION

The invention relates to a configuration of at least two exhaust gas turbochargers on an internal combustion engine, ~~in particular in a motor vehicle, as specified in the preamble of claim 4.~~

BACKGROUND OF THE INVENTION

A configuration such as this is disclosed in DE 198 22 874 A1; in it the two turbine housings integrally cast as one modular unit are mounted in parallel with each other, so that the drive shafts always extend in parallel between exhaust gas turbine and compressor impeller. The two admission channels of the exhaust gas turbine housing are paired; one admission channel may be controlled by way of an integrated valve so that with lower exhaust gas streams initially flow is introduced only into a first exhaust gas turbocharger, while flow is introduced into the second exhaust gas turbocharger with higher exhaust gas flows.

In addition, DE 199 48 220 A1 discloses another configuration of at least two exhaust gas turbochargers on an internal combustion engine, a configuration in which, while the drive shafts have an axis of rotation between the exhaust gas turbines and the compressor impellers, their structure is relatively complicated. Two exhaust gas turbochargers are engaged sequentially in a rather conventional layout. In accordance with the proposal disclosed, a first exhaust gas turbocharger has a hollow drive shaft through which extends the drive shaft of a second exhaust gas turbocharger.

SUMMARY OF THE INVENTION

The object of the invention is to propose a generic configuration which may be installed on an internal combustion engine in a structurally favorable manner, one which is advantageous

from the viewpoint of production technology and which represents an efficient, rapidly responding turbocharger.

It is claimed for the invention that this object is attained with the characteristics specified in ~~claim 1~~ the claims. Advantageous developments of the invention are also presented in the ~~other~~ claims.

It is proposed in accordance with the invention that the turbine housings be oriented so that the drive shafts are at least more or less in alignment relative to each other and so that the bearing housings are attached to the turbine housings on both sides. By preference the turbine housings may be integrally cast as one structural unit.

What is thereby obtained, to advantage, is a structurally compact, rugged turbine housing, which definitely could be produced in more than one part as well, with low weight, and which would yield considerable weight advantages and improvement in the exhaust gas emissions of the exhaust gas turbochargers resulting from lower temperature losses.

In addition, there is obtained, especially in the case of in-line internal combustion engines, a favorable configuration along the longitudinal periphery of the internal combustion engine with relatively free orientation of the connecting flanges adjoining the corresponding admission and discharge channels of the exhaust gas and the combustion air. The bearing housings and compressor housings adjoining on both sides could optionally be designed as similar components which are mounted on the turbine housings only as an alternative.

Lastly, the invention also yields advantages in manufacturing technology such as short machine tool adjustment times and machining times, in particular if the drive shafts in question are positioned in precise alignment between the exhaust gas turbines and the compressor impeller wheels.

It is also proposed that the pulse charging principle be followed in configuration and mooring of the admission channels of the exhaust gas turbochargers and especially in the case of

a four-cylinder in-line internal combustion engine, specific cylinders of the internal combustion engine being connected to the one and the other exhaust gas turbocharger with the exhaust gas connections separated. This permits virtually optimal actuation of the exhaust gas turbochargers even at low internal combustion engine speeds and loads.

Control of the boost pressure may be effected, depending on the structural expenditure selected, separately by way of two bypass valves or by way of a single bypass valve. Preference is to be given to combined boost pressure control with the structural expenditure taken into account, while separate boost pressure control involves more individual interventions into the engine control system with allowance made for efficiency and exhaust gas cleaning criteria.

It may be especially advantageous from the structural viewpoint to integrate the bypass lines and the bypass valves directly into the turbine housings.

BRIEF DESCRIPTION OF THE DRAWINGS

Two exemplary embodiments of the invention are described in greater detail in what follows with reference to the accompanying drawing, in which

FIG. 1 shows in diagrammatic form a configuration of two exhaust gas turbochargers with modular turbine housing for a four-cylinder internal combustion engine, in a partial longitudinal section, and

FIG. 2 the modular turbine housing for a modified configuration as shown in FIG. 1 with bypass lines and a bypass valve integrated into the turbine housing.

DETAILED DESCRIPTION OF THE INVENTION